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THE TEA QUARTERLY

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OF THE

TEA RESEARCH INSTITUTE

OF CEYLON

THE TEA RESEARCH INSTITUTE,
St. Coombs, Talawakelle,
Ceylon.

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The minimum effective concentration is 2 per cent in water, *i.e.* 2 lbs. of sodium chlorate in 10 gallons water. For satisfactory results it is necessary that the spray

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Corrigenda.

1. Please alter page "3" to page "27" and alter subsequent pages consecutively. It is important that these corrections be made as the index will refer to the corrected paging.
2. Please insert attached title slip at head of page 27 (old page 3).

must completely cover and wet all the leaves. After application a fairly dry period of at least 12 - 18 hours is necessary to allow absorption. A heavy and continuous downpour will wash off the chemical, but a very light drizzle may not impair its efficiency.

The amount of chlorate solution required to kill a given infestation will vary from about 100 to 200 gallons per acre, depending on the growth of the plants. Younger plants require less than older plants. Scorching takes place within a few hours after application and ultimately the treated plant dies in about 2 - 3 weeks.

The addition of an auxiliary substance to facilitate wetting is a useful method of increasing the efficiency of weedkillers. Such substances are commonly known as "spreaders" or "wetting agents" and many are now available on the market. "Teepol", a Shell product, has proved to be quite satisfactory for use with sodium chlorate. About 1 cigarette tin full of "Teepol" is added to each 10 gallons of the chlorate solution.

The most efficient and economic method of application is by means of knapsack sprayers—the types that are in use for blister blight control work, but fitted with nozzles, such as lime washing nozzles, capable of high volume spraying of about 30 - 40 gallons per hour. Machines used for applying sodium chlorate, if washed thoroughly with soap and water afterwards, can subsequently be safely used for spraying fungicides.

Sodium chlorate, like most weedkillers, has no effect on the viability of seed. It is accordingly a decided advantage to treat the plants before flowering, for one of the principal aims in the control of any weed should be the prevention of spread by seed. Where plants are treated after seeding, any seeds remaining can be destroyed by setting fire to the plants after they have been scorched by the chlorate.

A considerable reduction in the amount of chemical required may be effected by cutting the plants to within a few inches from ground level a day or two before the application is made.

When growth is scattered and in very limited areas it is probably more satisfactory to fork the plants out. With rising costs of labour, this method is, however, not practicable where infestations are widespread. Furthermore, the loosening of soil by forking, especially on the edges of banks, may probably do harm by way of erosion.

Another method of control that does not seem to find favour in Ceylon is the use of smother crops. A quick growing plant like Guatemala grass (*Tripsacum laxum*), if cultivated, will not only smother the *Eupatorium riparium* and other weeds but also provide useful material for thatching tea fields.

In Java, where this weed has spread considerably in recent years, it has been reported on favourably as a source of green material for compost. The cut tops can also be used as a thatch, provided the cutting is done before flowering. In gum plantations it forms a useful cover, the dense growth produced protecting the soil from the impact of heavy rain and insolation. Considerable amounts of humus are added to the soil by the decomposing leaves and stems and on steep slopes erosion is checked.

Since the above was written it has been discovered by Webster that *Eupatorium riparium* is an alternative host of the capsid bug *Lygus viridanus*, which he has recently shown to be the cause of the "corroded flush" symptoms on tea in plucking formerly attributed to the "Cercosporella" disease[1]. This affords a further reason for controlling this weed along jungle boundaries adjoining tea, at the higher elevations where *Lygus viridanus* is known to occur.

Reference

1. Webster, B. N.—Notes on Pathological Matters. The "Cercosporella" Disease. *Tea Quarterly* Vol. XXV Part (I) 18, 1954.

STUDIES IN BLISTER BLIGHT CONTROL

XIII. METHODS OF FUNGICIDAL APPLICATION IN THE CONTROL OF THE BLISTER BLIGHT DISEASE OF TEA

C. A. Loos

Over the last six years many forms of machinery for the application of fungicides have been tested out on Ceylon tea plantations, for the control of the blister blight disease of tea. The machines may be classed in three categories:—

(1) Large motorised, or motor-borne, units which require motorable roads for transportation. (Todds Insecticidal Fog Applicator, or the Micron Sprayer

(2) Motorised units which are too heavy for carriage by an individual, and which require footpaths for transportation. (Mini-Micron Sprayer or the "Whirlwind Duster").

(3) Units (motorised or hand-operated) which are sufficiently light for carriage by an individual and which can be conveniently carried along tea rows and over steep terrain. (Knapsack sprayer (both pressure-retaining and other types), rotary hand dusters, and the Duiker Mist Blower).

Categories 1 and 2 require fields which are adequately intersected with roads to allow the application of fungicide from different directions under frequently changing wind conditions. Haworth[1] has shown that copper dusts applied through the "Whirlwind" duster gave excessive copper deposits close to the machine, and inadequate deposits as the distance from the point of application increased. Under controlled wind conditions most of the copper, in the dust, fell in the first 100 feet and, though the dust was seen to carry for a considerable distance, deposits of copper beyond 250 feet were negligible. The Micron sprayer gave results similar to that of the duster, but was even less reliable as the mist became invisible 20 yards from the machine. The use of these types of machines is, therefore, limited, not so much in the method of application, but in the uneven deposits of copper particles over wide areas.

Marked advance has been made in machines listed in category 3. In this category we have three methods of fungicide application which are effective, practical and economic.

Knapsacks. The most desirable type is the pressure-retaining knapsack which is charged with fungicide through either a portable or motorised charge pump. Of the many makes of knapsacks now available all show considerable improvement over those in use six years ago. Further advances in design, construction and anti-corrosion protection are still required to enable the use of machines for spraying of insecticides, lime-wash and caustic washes.

The most spectacular advance has been in nozzle design. With the double swivel nozzle, manufactured by the Sprayings Systems Company of America, fitted with OC-O2 jets, now obtainable through the Colombo Commercial Company Limited, efficient protection is possible and enhanced acreages obtained per sprayer. In the experiment described in this article two rows of tea were sprayed simultaneously, but it seems reasonably possible that four rows could be given effective fungicide cover with correct nozzle setting, and this idea is at present being tested out in the field.

Rotary Hand Dusters. A number of makes have been on test. The most reliable has been the 'Orient' hand rotary duster, distributed by Messrs. Walker Sons & Company, Ltd. A recent development has been a duster manufactured by the Kestrel Engineering Works, though the model is still not available for general distribution.

Duiker Mist-blower, Type MAA—1953. The prototypes of this machine, manufactured by the Duiker Company of Holland, were developed by Mr. van Bemmel of the Royal Dutch Shell Laboratory on Kataboola Estate, Kotmale and St. Coombs, Talawakelle, in 1952 and early 1953. Machines were available in Ceylon from May 1953.

The machine, including a charge of $1\frac{1}{2}$ gallons spray liquid, weighs approximately 56 lbs. The unit is carried by means of two shoulder straps which sling the motor on to the operator's back while the two $\frac{3}{4}$ gallon spray containers are suspended on to the straps over the chest. The spraying part of the equipment consists of a movable blower fitted on a light weight metal arm and driven by a flexible drive from the engine. In the blower is a nozzle giving a hollow cone spray of an output of 2 imperial gallons per hour at 65 lbs. per square inch. The pressure in the spray tank is derived from the engine cylinder and passed through a non-return valve which prevents the blow back of liquid into the cylinder, should the engine stop during spraying operations. The blower is driven by the engine through a friction gear and clutch, a flexible cable and blower gear. The blower speed is approximately 11,000 r.p.m. The engine is fed with a mixture of petrol and oil and has a consumption of about 1 pint per hour.

The friction gear driving the blower, the non-return valve and flexible drive were the cause of frequent breakdowns during the trials on Meddecoombra Estate. The machines, after these faults were rectified, gave almost trouble-free service on Ragalla Estate.

The Meddecoombra and Ragalla Experiments

Meddecoombra Experiment. This experiment, which commenced on May 1st, 1953, and continued until September 30th, 1953, the duration of the South west monsoon, incorporated three forms of fungicidal application:—

(*a*) **Knapsack Spraying.** By means of the "Vermorel" pressure-retaining knapsack fitted with American Spraying Systems Company's double swivel nozzle and OC-O2 jets for spraying two rows of tea simultaneously. Shell copper fungicide was applied at a concentration of 4 ounces in 10 gallons water at approximately 15 gallons per acre, at 9-10 day intervals. A battery of 7-8 knapsacks, supported by 2 charge pumps, was in operation. The spraying gangs were supervised by a kangany. Two labourers manipulated the charge pumps, moved them from point to point as required, and mixed the fungicide. Bunded drains, streams and springs were used as the source of water supply. Water was at no time in this experiment transported by tractor or lorry.

(*b*) **Dusting.** The working gang consisted of a battery of 8 'Orient' rotary hand dusters, supervised by a kangany. An extra labourer helped to move dust and fill the containers. 'Cuprosana' 4 per cent copper dust was applied at 5 day intervals at 5 lbs per acre per application. There were, therefore, 2 applications over the plucking round of 10 days, or an application of 10 lbs dust per plucking round. Dusting was done across 5 rows bands.

(*c*) **Mist-blowing.** Four new machines were purchased while a further three prototype models were on loan from the Shell Company. Batteries of 5 mist-blowers were in general use, with 2 machines in reserve. The stand-by prototype machines had to be used frequently due to breakdowns of the standard machines.

Shell copper fungicide at a concentration of 6 ounces to 1 gallon water was applied at 1 gallon per acre. Mist-blowing was done over 5 row bands at 9-10 day intervals. In addition to the 5 operators, 2 labourers carried extra machines, fungicide containers, petrol etc. The spraying gang was supervised by a kangany while

an apprenticed mechanic was in attendance for running repairs, etc. It may be possible, if the standard machines do not have frequent breakdowns, to run a battery of 5 machines with one stand-by. Considerable spraying hours were lost due to change over of machines and the necessity for repairs in the field.

Acreages involved in the experiments were as follows:—

Hand spraying:	All first year fields		185 acres
Dusting:	1st year fields	92	
	2nd year fields	158	
		—	250 acres
Mist-blowing:	1st year fields	181	
	2nd year fields	52	
		—	233 acres

In each field a control (unprotected) plot, about 1/8th of an acre in extent, was marked out for a comparative assessment of the degree of control effected between protection and no-protection, and for an assessment of the severity of blister blight during the season under review.

Effectiveness of protection. Weather conditions were not very favourable to blister blight infection during the first two months of the experiment. May was almost rain-free; June weather was favourable to blister for about 10 days, but during the latter half of the month brilliant weather prevailed; July had 30 rainy days during which blister blight built up in intensity on the unprotected areas. A break in the weather from August 1st to 13th caused a further set-back to blister and it was not until early September that comparable results, with any degree of reliability, were possible. In September the unprotected plots showed a considerable amount of leaf blisters and light die-back of plucking shoots caused by stem infections. The knapsack sprayed areas were almost totally free of infection. Occasional bushes in the dusted areas showed severe infection while the mist-blown areas, though fairly well protected, showed the highest incidence of infection. Occasional complete rows showed numerous blisters indicating that either a change in wind direction of cessation of wind caused an uneven distribution of the fungicide.

Ragalla Estate. This experiment was over 200 acres of tea varying in age from 15 months to 56 months from pruning and protected with the modified Duiker mist-blowers. Shell Copper fungicide was used in this instance too at an application rate of 1 to 1¼ gallons per acre, of a mixture of 6 ounces fungicide in 1 gallon water. Protection was very good over a season which had been generally considered very favourable to blister blight.

The Manager of Ragalla Estate comments as follows:—

"At the start the engines gave considerable trouble on wet days and the aggregate loss of working time with five machines amounted to as much as two hours a day. Rain getting into the carburettor was the main cause of trouble, but this was remedied by providing a zinc cover for the carburettor and the air filter. Sparking plugs gave frequent trouble due to carbon deposits accentuated by the necessary addition of oil to the petrol tank. Changing of all plugs in all machines, twice a day, whether trouble was being experienced or not, reduced stoppages very considerably.

A high standard of maintenance is essential for good results and a good mechanic must be in attendance in the field. An intelligent factory worker could doubtless be trained for this work and his wages might be estimated at Rs. 3/50 a day while so employed.

The engine produces considerable vibration and it is, therefore, a harder task for the operator than when he works a knapsack sprayer. The equipment is secured in front and behind the operator and, should he fall, results could be very unpleasant. I do not recommend this equipment on very rough or steep country."

The cost of equipment and application. Choice of the type of machinery used in fungicide application must depend on a number of factors, chief of which is the availability of labour. Other factors are the severity of attacks of blister blight, the availability of water and supervision. Both spraying and dusting operations require careful organisation of estate practices. Pluckings must be so arranged that a reasonable period elapses between applications of the fungicide and removal of leaf for manufacture, to avoid excessive copper residue in the manufactured tea.

We do not advise the recruitment of extra labour to allow of protection by spraying, unless labour requirements are already below normal estate requirements. Extra labour must only be recruited if, during the four or five months when no spraying is done, work can be found for the extra labourers. If labour shortage has to be reckoned with, the choice of protection methods lies between dusting and mist-blowing. New dust formulations, now available, show marked improvement in formulation and, therefore, enhanced control. The choice is, therefore, obvious as mist-blowing has not given control superior to that of dusting, and more intelligent supervision is essential in working the mist-blower.

The size of spraying or dusting gangs must depend on the frequency of plucking rounds and the acreages plucked each day. A safe practice is to spray or dust the day after plucking, the full acreage plucked the previous day. On estates, where plucking rounds are at 10-14 day intervals, fewer knapsack sprayers would be required than on estates plucking at 5-7 day intervals, as only one application of the fungicide would be required in either case. Where dusting is the method of protection adopted, estates on 10-14 day plucking rounds, would require more dusting units than would be necessary if plucking rounds are at 5-7 day intervals, as two applications of dust would be required during the longer plucking rounds against one on the shorter plucking rounds.

The average number of acres covered by an operator in the Meddecoombra experiment was 3.7 acres with the double nozzled knapsack, 6.6 acres with the mist-blower and 8.0 acres with the duster. Utilising conveniently sized batteries it is, therefore, possible to protect daily 37 acres with knapsack (10 machines), 33 acres with the mist-blowers (5 machines) and 64 acres with the dusters (8 machines). These figures must be considered as minimum acreages as some estates claim as many as 5 acres with a knapsack, 10 acres with a duster, and on Ragalla Estate an average of 9 acres was covered with a mist-blower.

Accurate costings, applicable to all estates, are not possible as factors such as type of terrain, weather conditions and efficiency of labour, all of which effect costs, vary considerably from estate to estate. However, the costings of the Meddecoombra Estate experiment may serve as a useful guide in the preparation of estate annual estimates, and are published on that assumption.

The cost figures from the Meddecoombra Estate experiment are used to estimate the cost of apparatus and application of fungicide over an assumed acreage of 500 acres. In the first set of cost figures plucking rounds are at 10 day intervals and would require two applications of dust for effective protection. In the second set of costing figures plucking is assumed at 8 day rounds.

The costings are based on the following assumptions:—

(*a*) Area to be protected—500 acres.
(*b*) Protection period—May-December (8 months).
(*c*) Spraying with "Vermorel" pressure retaining knapsacks fitted with American boomjet nozzles and OC-O2 tips for spraying two rows of tea simultaneously. Acreage per knapsack at 3.7 acres.
(*d*) Dusting with the 'Orient' rotary hand duster. Dusting to be done across 5 row bands. Acreage per duster at 8.0 acres.
(e) Mist-blowing with the Duiker mist-blower. Applications to be made across 5 row bands. Acreage per mist-blower 6.6 acres.
(*f*) Materials and labour at current cost.
(*g*) Crop return of 750 lbs. made tea per acre.

Cost Estimations 1A

Knapsack spraying of two rows of tea simultaneously with the "Vermorel" pressure-retaining knapsack fitted with the American double swivel nozzle with two OC-O2 jets. Copper fungicide applied at 15 gallons per acre at 10 day intervals (9 ounces copper per month).

2 batteries (1 of 8 and the other of 9 knapsacks with 2 charge pumps per battery). Spraying for 24 days a month for 8 months.

Cost of Equipment.

(1)	17 Sprayers at Rs. 250/-	Rs.	4,250.00	
(2)	4 charge pumps at Rs. 345/-		1,380.00	
(3)	17 double nozzles at Rs. 21/-		357.00	
		Rs.	5,987.00	
(4)	Depreciation per annum at 25%	Rs.	1,496.75	
(5)	Depreciation per acre per annum			Rs. 2.99

Cost of Fungicides.

(6)	4,500 lbs at Rs. 2/- per pound	Rs.	9,000.00	
(7)	Cost per acre per annum			Rs. 18.00

Cost of Labour.

(8)	17 Labourers for spraying			
(9)	4 labourers for charge pumps.			
(10)	4 labourers for water carriage			
(11)	2 kanganies for supervision			
(12)	27 labourers at Rs. 52/56 per month of 24 days for 8 months	Rs.	11,352.96	
(13)	Cost per acre per annum			Rs. 22.71

Other Items.

(14)	Sugar and tea to sprayers	Rs.	483.84	
(15)	Bonus to sprayers at 25 cents per working day	Rs.	1,296.00	
		Rs.	1,779.84	
(16)	Cost per acre per annum			Rs. 3.56
(17)	Total cost per acre per annum			Rs. 47.26
(18)	Cost per pound of made tea, assuming a crop of 750 lbs made tea per acre per annum			Cts. 6.3

Cost Estimations—1B

Dusting 5 row bands with an 'Orient' rotary hand duster. "Cuprosana" 4 per cent copper dust applied at 5 lbs per acre every 5 days. (19-1/5 ozs. copper per month). Plucking rounds at 10 day intervals. Dusting 24 days a month for 8 months. 2 batteries of 8 dusters required to cover 500 acres.

Cost of Equipment.

(1)	16 'Orient' dusters at Rs. 145/-	Rs.	2,320.00	
(2)	Depreciation per annum at 25%	Rs.	580.00	
(3)	Depreciation per acre per annum			Rs. 1.16

Cost of Fungicide.

(4)	120,000 lbs at Rs. 39.90 per cwt.	Rs. 42,750.00	
(5)	Cost per acre per annum		Rs. 85.50

Cost of Labour.

(6)	16 labourers for dusters		
(7)	2 labourers for carriage of dust		
(8)	2 kanganies for supervision		
(9)	20 labourers at Rs. 52/56 per month of 24 days for 8 months	Rs. 8,409.60	
(10)	Cost per acre per annum		Rs. 16.82

Other Items.

(11)	Sugar and tea to dusters	Rs. 358.40	
(12)	Bonus at 25 cents per working day	Rs. 960.00	
		Rs. 1,318.40	
(13)	Cost per acre per annum		Rs. 2.64
(14)	Total cost per acre per annum		Rs. 106.12
(15)	Cost per pound made tea, assuming a crop of 750 lbs per acre per annum		Cts. 14.15

Cost Estimations—1C

Mistblowing 5 row bands with the Duiker mist-blower. Copper fungicide at a concentration of 6 ounces in 1 gallon water applied at 1 gallon per acre at 10 day intervals (9 ounces copper per month). Spraying 24 days a month for 8 months.

Cost of Equipment.

(1)	10 mist-blowers at Rs. 1,625/-	Rs. 16,250.00	
(2)	Depreciation at 33⅓ %	Rs. 5,416.66	
(3)	Depreciation per acre per annum		Rs. 10.83

Cost of Fungicide.

(4)	4,500 lbs at Rs. 2/- per pound	Rs. 9,000.00	
(5)	Cost per acre per annum		Rs. 18.00

Cost of Labour.

(6)	10 labourers for mist-blowers.		
(7)	2 labourers for water carriage		
(8)	2 kanganies for supervision		
(9)	14 labourers at Rs. 52/56 per month of 24 days for 8 months	Rs. 5,886.72	
(10)	Cost per acre per annum		Rs. 11.77
(11)	2 mechanics (at special pay rate of Rs. 3/50 per working day Rs. 84/- per month)	Rs. 1,344.00	
(12)	Cost per acre per annum		Rs. 2.69

Working Costs.

(13)	Petrol at ½ pint per acre per application = 750 gallons at Rs. 2/60	Rs. 1,950.00	
(14)	Oil at 4 per cent of petrol used = 30 gallons at Rs. 9/09	Rs. 272.70	
		Rs. 2,222.70	
(15)	Cost per acre per annum		Rs. 4.44

Other Items.

(16)	Sugar and tea to sprayers	Rs.	250.88		
(17)	Bonus to sprayers	Rs.	672.00		
		Rs.	922.88		
(18)	Cost per acre per annum			Rs.	1.84
(19)	Total cost per acre per annum			Rs.	49.57
(20)	Cost per pound of made tea assuming Crop of 750 lbs per acre per annum			Cts.	6.61

Cost Estimations—2A

Spraying 2 rows simultaneously with "Vermorel" pressure-retaining knapsack fitted with American double nozzle with two OC-O2 jets. Copper fungicide applied at a concentration of 4 ounces in 10 gallons water and applied at 15 gallons per acre every 8 days. (11¼ ounces copper per month). Spraying 26 days a month for 8 months.

Cost of Equipment.

(1)	20 sprayers at Rs. 250/-	Rs.	5,000.00		
(2)	4 charge pumps at Rs. 345/-	Rs.	1,380.00		
(3)	20 double nozzles at Rs. 21/-	Rs.	420.00		
		Rs.	6,800.00		
(4)	Depreciation at 25%	Rs.	1,700.00		
(5)	Depreciation per acre per annum			Rs.	3.40

Cost of Fungicides

(6)	5,625 lbs at Rs. 2/- per lb. for 500 acres for 8 months	Rs.	11,250.00		
(7)	Cost per acre per annum			Rs.	22.50

Cost of Labour.

(8)	20 labourers for sprayers				
(9)	4 labourers for charge pumps				
(10)	4 labourers for water carriage				
(11)	2 kanganies for supervision				
(12)	30 labourers at Rs. 56/94 per month of 26 days for 8 months	Rs.	13,665.60		
(13)	Cost of labour per acre per annum			Rs.	27.33

Other Items

(14)	Sugar and tea to sprayers	Rs.	537.60		
(15)	Bonus to sprayers	Rs.	1,560.00		
		Rs.	2,097.60		
(16)	Cost per acre per annum			Rs.	4.20
(17)	Total cost per acre per annum			Rs.	57.43
(18)	Cost per lb. made tea assuming crop of 750 lbs per acre per annum			Cts.	7.66

Cost Estimations—2B

Dusting 4 row bands with an "Orient" rotary hand duster. Copper fungicidal dust of 4 per cent copper, applied at 5 lbs per acre every 8 days (12 ounces copper per month). Dusting 26 days a month for 8 months.

Cost of Equipment.

(1)	9 'Orient' dusters at Rs. 145/-	Rs. 1,305.00	
(2)	Depreciation per annum at 25%	Rs. 326.25	
(3)	Depreciation per acre per annum		Rs. 0.65

Cost of Fungicides.

(4)	75,000 lbs at Rs. 39.30 per cwt. for 500 acres for 8 months	Rs. 26,316.96*	
(5)	Cost per acre per annum		Rs. 52.63*

Cost of Labour.

(6)	9 labourers for dusters 2 labourers for carriage 1 kangany for supervision 12 labourers at Rs. 56/94 per month of 26 days for 8 months	Rs. 5,466.24	
(7)	Cost of labour per acre per annum		Rs. 10.93

Other Items

(8)	Sugar and tea for dusters	Rs. 215.04	
(9)	Bonus to dusters	Rs. 624.00	
		Rs. 839.04	
(10)	Cost per acre per annum		Rs. 1.68
(11)	Total cost per acre per annum		Rs. 65.89
(12)	Cost per pound of made tea, assuming a crop of 750 lbs per acre per annum		Cts. 8.78

*Based on the use of the cheapest suitable dust. The figure will depend on the choice of fungicide and could rise to Rs. 31,640.62, or 63.28 cents per acre per annum.

Cost Estimations—2C

Mist-blowing 5 row bands with the Duiker mist-blower. Copper fungicide at a concentration of 6 ounces in 1 gallon water applied at 1 gallon per acre every 8 days) 11¼ ounces copper per acre). Spraying 26 days a month for 8 months.

Cost of Equipment.

(1)	11 mist-blowers at Rs. 1625/- (This is set out at the use of 2 batteries of 5 and 6 blowers to cover 500 acres every plucking round).	Rs. 17,875.00	
(2)	Depreciation at 33-1/3% (Suggested depreciation by the manufacturer's Engineer)	Rs. 5,958.33	
(3)	Depreciation per acre per annum		Rs. 11.92

Cost of Fungicides

(4)	5625 lbs at Rs. 2/- per pound for 500 acres for 8 months	Rs. 11,250.00	
(5)	Cost per acre per annum		Rs. 22.50

Cost of labour.

(6)	11 labourers for mist-blowers 2 labourers for water carriage		

	2 kanganies for supervision 15 labourers at Rs. 56/94 per month of 26 days for 8 months	Rs.	6,832.80	
(7)	Cost of labour per acre per annum			Rs. 13.67
Mechanics Supervision.				
(8)	2 mechanics (special factory workers at Rs. 3/50 per day as suggested by the Supdt. Ragalla Estate) for 26 days per month for 8 months	Rs.	1,456.00	
(9)	Cost per acre per annum			Rs. 2.91
Cost of Working.				
(10)	Petrol at ½ pint per acre = 937.5 gallons at Rs. 2/60	Rs.	2,437.50	
(11)	Oil at 4% of petrol used = 37.5 gallons at Rs. 9.09	Rs.	340.87	
		Rs.	2,778.37	
(12)	Cost per acre per annum			Rs. 5.56
Other Items.				
(13)	Sugar and tea for sprayers	Rs.	268.80	
(14)	Bonus to sprayers	Rs.	780.00	
(15)	Cost per acre per annum	Rs.	1,048.80	
				Rs. 2.10
(16)	Total cost per acre per annum			Rs. 58.66
(17)	Cost per pound made tea, assuming a crop of 750 lbs. per acre per annum			Cts. 7.82

Acknowledgements

I wish to record my grateful thanks to the Eastern Produce and Estate Co. Ltd. to Mr. H. Andrews, the Group Manager, and Mr. J. N. Parsons for their willing co-operation during the period of the experiment on Meddecoombra. Our thanks are also due to Mr. A. R. Williams of Ragalla Estate for running the mistblowing trials on Ragalla and for his helpful criticism.

Reference

(1) Haworth, F.—Distribution of copper containing dusts. "*Tea Quarterly*" Vol. XXII, Pt. III. Sept. 1951, pp.118-120.

STUDIES IN BLISTER BLIGHT CONTROL

XVI. CONCLUSION

J. Lamb

Prophylactic measures for the purposes of minimising attacks of the blister blight of tea are now an accepted part of tea estate routine in Ceylon. Of the success of these measures there is no doubt. Anxieties about the prognosis of the disease have gradually given way to concern about additions to cost of production and recent research work has been almost exclusively connected with the economics of control.

As pointed out at the last Conference, the Institute cannot pursue research to the point where it becomes concerned with the relative merits of proprietary fungicides and equipment. Once a reasonable technique for any particular agricultural operation recommended by the Institute has been evolved, the choice of materials and equipment must be left to commercial interests. Reputable dealers in fungicides and spraying or dusting equipment can be trusted to maintain the standard of their products and there is now sufficient competition to prevent any exploitation of the tea ndustry as a whole.

This particular series of articles will therefore be brought to a close, but this does not mean that all research on blister blight control will cease. It will be most disappointing if there is not any practical progress on methods of controlling fungus diseases of plants during, say the next decade, but at the present moment it is difficult to envisage any fundamental development which can effect routine spraying or dusting during the next three or four years. The most probable line of progress is in the development of fungicides which will increase the period of protection, for it will be readily appreciated that any fungicide, whose prophylactic effects lasted for twenty days, would straightaway tend to halve the cost of protection. In such a case, however, the mode of action would probably be fundamentally different to the present copper fungicides and prolonged tests would be advisable to ensure the absence of insidious effects upon the growth of the tea bush.

Apart from progress with fungicides there are always possibilities of improving the method of application but in view of the exhaustive investigation already carried out it is difficult to be optimistic about substantial progress until fundametal progress has been made in mechanisation of cultural operations in tea. The Wright Report[1] leaves no room for doubt that mechanisation is essentially linked with replanting, and in this case, the use of blister blight resistant clones offers a better solution to the problem of blister blight.

Looking back to 1949 it would not be unreasonable to claim that progress has been rapid. The tea industry in Ceylon has in fact made considerable contributions to the practice of plant protection. First, spraying and dusting during continuously wet monsoon weather was quite novel and up to the time of the Kataboola trials it is improbable that any other crop had been successfully protected against a serious fungus disease by weekly routine spraying irrespective of weather conditions. The successful protection of 200 acres of tea recovering from pruning through a severe south west monsoon was no mean feat, and it was indeed a fortunate circumstance that tea leaf retains sufficient fungicide to give effective protection under such conditions.

Secondly, low volume spraying was in its early infancy when the problem of blister blight arose. The first success with copper fungicides was attained by using

so[illegible] of the order of 100 gallons per acre [illegible]
15 [illegible]re with knapsack spraying was another [illegible]
p[illegible] flowers, success has been claimed with [illegible]
in[illegible] complexity of the spraying apparatus [illegible]
judg[illegible]rime application.

[illegible] since the successful development of low [illegible]
gain[illegible]en made in coverage. [illegible] the time of the [illegible]
co[illegible]e acre per labourer per day was considered [illegible]
is [illegible]d to find coverages of 4 acres per labourer [illegible]
for [illegible] estate in the present season. Nothing [illegible]
terrain, is[illegible] acres per labourer per day.

[illegible] is seldom a steady and continuous process [illegible]
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wel[illegible]ust be satisfied for the time being. [illegible]
ar[illegible]ch is now closing, will be followed by a [illegible]
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to [illegible]ected in minor improvements [illegible]
att[illegible]he future will be focussed on [illegible]
pr[illegible]sibilities. This will be a [illegible]
of [illegible]e of "systemic" fungicides [illegible]
The [illegible]light fungus is to all intents and [illegible]
inst[illegible] the soil. All weed killers [illegible]
be [illegible] to detect slight toxic effects [illegible]
a considerable period.

[illegible]ime time it must be realised that [illegible]
are [illegible]ly effective and that they will be [illegible]
Onl[illegible]s per acre of the common fungicides [illegible]
are [illegible] to control the virulent [illegible]
very [illegible]ely with all the most modern [illegible]
In a[illegible] copper fungicides are stable, [illegible]
nation of properties will not be easy to supplement.

[illegible]cles numbered XIII, XIV and [illegible]
cal d[illegible]ded to guide estate policy. [illegible]
knaps[illegible] in a suitable nozzle such as [illegible]
OC-C[illegible] spraying a suspension of 4 oz. of [illegible]
wate[illegible] rate of approximately 15 gallons per [illegible]
efficie[illegible] a battery of such equipment [illegible]
charg[illegible] as described in the *Tea Quarterly* [illegible]
1954.

[illegible]e term protection, hand dusting [illegible]
dusts [illegible]ve adequate protection when used at the [illegible]
certain[illegible]ntages, and may also be regarded as a [illegible]
ing. [illegible]stitute does not, however, recommend [illegible]
subject [illegible]olonged attacks of blister blight.

M[illegible]owing is less certain as it is feared that [illegible]
cated [illegible] of the equipment, especially when used [illegible]
outwei[illegible] advantages of ultra low volume [illegible]
acreage [illegible]abourer. It may well, however, [illegible]
especia[illegible]ore arrangements can be made for [illegible]

E[illegible]t and fungicides have been developed [illegible]
routine [illegible]ements for several years to come, but [illegible]
vision [illegible]uire constant revision and attention. [illegible]
seasons [illegible]vourable to blister blight for, under such [illegible]
be indi[illegible]t work, may give apparently satisfactory [illegible]
sense of [illegible]ty. The monsoons of the past two or three years have on the whole [illegible]
been fa[illegible]ble to vigorous growth of tea and not wholly favourable to blister blight.
A prolo[illegible] period of bad growing weather, sunless and [illegible] for months on end,

such as may occasionally happen, will strain the present technique for protection to its limits. It is still a common experience to be "caught out" at the beginning of the monsoon by unexpectedly severe attacks when the weather is misjudged and spraying is commenced too late. It is also obvious that spraying gangs periodically slacken off and that a change in the weather reveals their shortcomings. Usually such attacks come under control when the technique is improved and the weather changes for the better. A heavy attack at the beginning of a very prolonged period of difficult weather will not visibly react, even to the most efficient spraying, for a considerable time, because even the best technique cannot be 100% effective and numerous sporing blisters will maintain a very high level of infection under misty, sunless conditions.

Constant vigilance is, unfortunately, indispensable and adds considerably to the responsibility of the Estate Superintendent apart from additional costs. When an attack is slow to come under control, the theory of mutation and resistance to copper fungicides is sometimes advanced. Blister Blight has been known for at least seventy years and there is no reason to suppose that any mutations have occurred in this time. All that can be said is that we sincerely hope that the emergence of a copper resistant strain will not occur in Ceylon, that it is improbable, and that we shall be extremely unfortunate if it occurs just as blister blight control is settling down to a routine.

The efficiency of fungicides is also sometimes questioned and it occasionally happens that there are grounds for suspicion of old stocks, especially when the containers have deteriorated. There is no reason to carry large stocks of fungicides on estates and no reason to suspect that reputable proprietary products vary in their effectiveness. The packages should always be inspected on arrival on the estate and damaged ones either used immediately or returned to the agents.

Although these final words may seem somewhat harsh, it is obviously sounder to accept probabilities rather than to advance obscure explanations when the control of blister blight is unsatisfactory. On the basis of established facts, the order of probability in seeking explanations of unsatisfactory results is as follows:—

1. Inefficient spraying
2. Inefficient supervision
3. Inefficient organisation, especially bad mixing and insufficient dispersion of fungicide before spraying.
4. Inefficient nozzles, especially worn orifices
5. Inefficient fungicides, especially due to deterioration through bad storage.

Reference

1. Wright, S. J.—*Tea Quarterly*, Vol. XXIV, Part III, 1953, page 57.

MATTAKELLE DUSTING TRIAL.

It is possible that there may be some misunderstanding on the subject of the practical use of Cuprosana dust as a result of the comparative trial reported in our last issue (*Tea Quarterly* XXV (1) pp. 10-12 March 1954).

This dust has for some time been recommended by the T.R.I. as being the only dust suitable for application against blister blight. Although other suitable dusts are now available, our opinion with regard to the merit of Cuprosana has in no way changed.

MISCELLANEOUS NOTES

A NOTE ON MULCHES

Professor H. B. Tukey, Ph.D. of Michigan State College of Agriculture, delivering the 5th Amos Memorial Lecture at East Malling in September, 1952, remarked that one of the most outstanding contributions to orchard management had been the use of mulches. He himself had never had to resort to the spade or the hoe on a heavily mulched plantation of strawberries. Under mulch, minor deficiency trouble tended to disappear, rain penetrated more easily, and moisture conditions improved. Spoiled hay was the main material used. Later on Professor Tukey said mulching was still in its infancy. In America they had used anything they could lay hands on—saw dust, hay, clippings, seaweed, straw. He suggested that when water entered the mulch, some nutrients were washed from it into the roots of the plants.

A NOTE ON SOIL FUMIGATION.

C. A. Loos.

Soil fumigation of tea nurseries is helpful in reducing eelworm populations and other injurious soil insects such as wireworm, white grub and cut-worm. As a routine measure at each replanting time it is a practice worth considering.

Shell D-D soil fumigant is probably the most efficient of the soil fumigants, but Ethylene Dibromide (EDB) also affords satisfactory results. EDB is available as Nematrox 100 from Messrs. Mackwoods, Ltd., or as Ethylene Dibromide from the Shell Company of Ceylon.

EDB is applied in much the same way as Shell D-D, but requires dilution in a light diesel oil for application. EDB should be diluted at 10 per cent by weight in the diluent and applied through an injector gun, quantities of 5 ccs being injected at 12 inch spacings each way. The injector nozzle should be set to deliver the fumigant 6 inches below the soil surface.

The soil should previously be made free of clods and undecomposed organic matter such as roots of the preceding crop. The soil must be fairly moist and neither too wet or very dry.

Soils treated with EDB should be lightly watered immediately after treatment to retain the toxic fumes for as long a period as possible. Two weeks later the beds should be forked up to allow the fumes to disperse. At least 4 weeks should elapse between fumigation and planting of the nursery beds, as early planting may result in the development of phytotoxic effects.

A NOTE ON SOIL STERILISATION

B. N. Webster.

The method of soil fumigation detailed above will deal adequately with most nematode and insect pests likely to be troublesome in tea and green manure nurseries. It will have little or no effect, however, on soil-borne fungus diseases such as are caused by the various "damping off" organisms. *Sclerotium rolfsii*, *Fusarium* spp., *Rhizoctonia* sp. and *Pythium* spp., have all been found troublesome in nurseries, particularly those which have been used year after year for the same purpose.

When new nursery space is not available considerable success with basket plants has been gained by partial sterilisation of the soil of old nurseries. Various methods are available including steam, formalin, and electrical methods, of which steam is the most suitable for estate nurseries.

Oil drums or similar steel vessels form ideal soil containers and the greatest effiiciency may be gained by fitting a metal soil container with a perforated bottom over several inches of water in the bottom of a drum. The drum is supported on legs and a fire built below it. Dry, sifted soil is then sterilised for 1 - 2 hours at a temperature of 180° F. (considerably too hot to bear). A less efficient, but useful method is the direct heating of damp soil contained in a drum mounted over a fire. Using this method the soil should be mixed from time to time, and steam holes should be made through it occasionally with a rod. This method requires considerably longer heating, a period of 2 - 3 hours being indicated.

It should be noted that soil and organic materials such as composts, manure, etc. should always be sterilised separately as otherwise a harmful excess of nitrogen may result. To correct any adverse nutrient balance resulting from sterilisation, superphosphate should be added to soils at a rate of $1\frac{1}{2}$ ounces per bushel, and ground chalk added at a rate of $\frac{3}{4}$ oz. per bushel. (1 bushel = 8 gallons or 2 kerosene tins). Ground chalk may be used in the form of builders whiting (not whitewash) or precipitated chalk, obtainable from any pharmacy.

Further details can be made available to anyone who requires them.

PROPAGATION OF DADAP

P. W. Davis.

With reference to the experiments on the propagation of dadap published in the Annual Report of the Plant Physiologist for 1952 (*Bull.* 34, *p.* 35) *Mr. P. W. Davis of Kaimabetta Estate, S. Coorg., S. India has sent us the following practical note, which should materially assist those still finding difficulty in obtaining successful establishment of their dadap cuttings.*

As a matter of interest, in South India, it has been found that it is of advantage to ring the cuttings on the trees early in April, with a view to planting them out in the field in June. The ringing is done to a length of about 4" at the base of the new shoot above last year's cut, and the ringing is only done down to the cambium. It is very rare, even in most difficult conditions, for these cuttings to fail, even though all untreated cuttings fail under the same conditions.

MINUTES OF THE MEETING OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON HELD AT THE OFFICES OF THE PLANTERS' ASSOCIATION OF CEYLON, AT 2-30 P.M. ON FRIDAY, 11TH DECEMBER, 1953.

Present. Mr. R. C. Scott, C.B.E. (Chairman), Dr. A. W. R. Joachim, M.B.E. (Director of Agriculture), Messrs C. Dymoke Green (Chairman, Agency Section P.A. of Ceylon), W. R. Vander Kiste (Chairman, P.A. of Ceylon), W. H. Attfield, V. G. W. Ratnayake, M.B.E., M.P., G. K. Newton, W. Neal de Alwis, M.P., Errol Jayawickreme, J.P., U.M., D. E. Hettiarachchi, J.P., U.M., A. D. McLeod, A. J. Dickson, H. S. Hurst and J. Lamb (Director and Secretary).

The following were present by invitation:—Mr. B. Mahadeva (Tea Controller) and E. S. Rose (Superintendent, St. Coombs).

1. Notice convening the meeting was read.

A message was received from Mr. A. G. Ranasinha, C.M.G., O.B.E., regretting his inability to be present at the meeting.

The Chairman then referred to the death of Mr. G. K. Stewart which took place in the United Kingdom on 11th November, 1953. He said that Mr. Stewart was Chairman of the Board from 29th March 1932 to 26th November, 1932. A vote of condolence was passed in the usual manner.

2. **Minutes of Board Meeting held on 30th October, 1953.**

The Chairman reported that copies of the minutes had been circulated to members and that no comments had been received thereon. The minutes were confirmed.

3. **Membership of the Board & Committees.**

(a) Board.

The Chairman welcomed Mr. A. J. Dickson who had resumed his seat on the Board and Mr. B. Mahadeva, the Tea Controller, who was also present at the meeting by invitation but who would soon be an ex-officio member of the Board when the proposed amendment to the Tea Research Ordinance was passed.

(b) Estate & Experimental Sub-Committee.

The Chairman reported that Mr. Arthur Watt of Endane Estate, Kahawatte had been invited to act for Mr. R. J. S. Bean on the Committee during the latter's absence out of the island. Mr. Bean was due back at the end of April next year.

4. **Visiting Agent's Report.**

The Chairman informed members that the report had been considered in great detail by the Estate & Experimental Sub-Committee at the meeting held on the 26th/27th November, 1953.

5. **Minutes of the Meeting of the Estate & Experimental Sub-Committee held on the 26th/27th November, 1953.**

It was reported that copies of the minutes of the above meeting were issued to members. The Chairman remarked that a great deal of those minutes were concerned with the Estate estimates for 1954 which would come up for consideration at a later stage of the meeting.

Estimates for 1954.

The Chairman reported that the Finance Sub-Committee had that morning given very careful consideration to the estimates for 1954.

He said members had copies of these estimates together with the forecast of the financial position of the Institute at the end of this year and the next. These were based on the present cess of 25 cents per 100 lbs. of tea exported. As such he did not consider it worthwhile discussing the estimates in great detail as they would require revision when the increased cess was approved.

(i) St. Coombs Estate Estimates.

The St. Coombs Estate estimates were then considered. The Chairman informed members that these had been scrutinised both by the Estate & Experimental Sub-Committee and by the Finance Sub-Committee that morning.

The estimates were considered page by page and approved.

The following comments on the undermentioned votes were recorded.

Vote 33—Illuk & Cootch. The total of Rs. 5,050/- should read Rs. 2,520/- This would reduce the total cost of upkeep.

Vote 40—Working Up Poor Areas. It was generally agreed that much of the expenditure under this heading would not normally be undertaken by a commercial estate and therefore contributed to the high cost of production on St. Coombs.

(ii) Research Estimates.

Revenue Account. The Research Revenue estimates were then considered in detail.

The Chairman drew members' Attention to the following:—

Vote 4—Assistant Staff Administration. Provision was included under this head for one additional accounts clerk on a starting salary of Rs. 120/- per mensem and a further temporary accounts clerk to undertake the compilation of the register of fixed assets on a salary of Rs. 200/- per mensem for a period of six months.

Mr. McLeod considered that additional assistance was required in the accounts department. Agreed.

Vote 18—Scientific Officer (Mr. T. E. Walter) & Vote 20A—Engineer (Mr. J. Landreth).

The Chairman pointed out that the increase in the salaries of these two officers in 1954 as compared with the amounts shown for 1953 was due to the fact that both Mr. Walter and Mr Landreth were on leave during 1953 and their salaries were charged to Furlough Passages Reserve Account.

The Chairman pointed out that the blister blight account would be closed at the end of March 1954, from which date a Workshop Account would be maintained.

The Research Estimates were approved on the proposal of Mr. G. K. Newton, seconded by Mr. W. H. Attfield.

Investments.

(i) Tea Research Institute. It was agreed that the sum of Rs. 75,000 be placed in Government of Ceylon Treasury Bills. The balance in the current account of the Institute at 30th November, 1953, was Rs. 133,670.

(ii) Junior Staff Provident Fund. It was also agreed that Rs. 25,000 out of the balance of Rs. 50,310 lying to the credit of the above fund at 30th November, 1953, be invested in the best possible manner in consultation with Messrs. Forbes & Walker.

7. Small Holdings Advisory Service

The Chairman reported that copies of the minutes of the meeting of the Sub-Committee held on 30th October, 1953, had been issued to members. The estimates of the Small Holdings Service for 1954 had been scrutinised by the Sub-Committee and were recommended for approval. These estimates were appended to the minutes. Approved.

The Director reported that as recommended by the Sub-Committee the proposal put forward by Mr. Neal de Alwis regarding housing arrangements for Small Holdings Officers & Instructors had been partly implemented. The Officer-in-Charge had so far been successful in negotiating the lease of three houses. He (the Director) had pointed out at the meeting of the Small Holdings Sub-Committee held that morning that the Officer-in-Charge should not complete the lease until the Board's approval had been obtained. He considered such an arrangement to be a sound investment as there would be a saving in the rental payable on such houses and also that it would help to solve the accommodation difficulties of small holdings staff. Agreed.

8. Staff

(i) Agricultural Chemist—Mr. J. A. H. Tolhurst.

The Chairman recalled that at the last meeting of the Board it was agreed to allow Mr. Tolhurst further medical leave on 2/3rds of his monthly basic salary until this meeting when a further report would be available on the condition of Mr. Tolhurst's progress.

The Director stated that he had received a letter from Mr. Tolhurst in which he expressed the view that he would be able to return to Ceylon in March next year and that his progress had been satisfactory. This view was supported by Mr. Taylor, M.Ch., F.R.C.S. of the Wingfield Memorial Hospital, Oxford.

The Board agreed to extend Mr. Tolhurst's medical leave on the same terms, i.e. at 2/3rds of basic salary, until the end of March, 1954.

(2) Field Assistant, St. Coombs—Mr. B. Asirwadem.

It was reported that Mr. Asirwadem was due to leave the Institute on the 31st of December, 1953, on the expiry of the three months' notice served on him.

9. Any Other Business

(i) Virus Wilt Disease of Natada nararia.

The Director reported interesting developments in possibilities for biological control of nettle grub. Electron microscope photographs were tabled.

(ii) Withering Experiments.

The Director reported that the progress made in these experiments was very satisfactory, and that the prices realised on the teas made were far above the average market prices.

(iii) St. Coombs Caddai.

The Chairman reported that legal opinion on the contract with the present lessee was that provided the Institute did not require the building and the land on

which it was situated for purposes connected with the Institute, the lessee held the option of a renewal of the lease for a further five years on such terms as should be mutually agreed on between the two parties.

It was proposed that the lease be renewed but that the rent be put up from Rs. 50/- to Rs. 150/- per month in order to meet costs of repairs and upkeep of the building and surrounds, as from 1st January, 1954. Agreed.

(iv) Firewood supplies.

The Chairman informed members that he was very concerned over the extremely critical position at St. Coombs as regards firewood supplies. At the moment, the supply had practically run out and the demand from the staff could not be met. The Estate & Experimental Sub-Committee had at the last meeting recommended that the staff be supplied with kerosene cookers. From details obtained so far it appeared that the total cost of these cookers would amount to approximately Rs. 9,000/-

The Board agreed that in view of the critical position, the staff be supplied with kerosene cookers, and the cost recovered in easy monthly instalments of Rs. 5/- for Assistant and Minor Staff and Rs. 10/- for senior staff.

(v) St. Coombs Estate Title Deeds.

It was reported that information had been received from the Treasury that the question of the release of the Title Deeds of St. Coombs estate had been referred to their lawyers.

(vi) Junior Staff Medical Fund.

It was reported that a meeting of the Committee of Management of the Fund would be called up as early as possible in the new year to consider the memorandum submitted by the Junior Staff Association.

(vii) Chairmanship

The Chairman informed members that he had held the office of Chairman for nine years and that he was willing to carry on for a further year. This statement was received with acclamation.

Before closing the meeting, the Chairman wished all members a Happy Christmas and a Bright New Year.

Sgd. J. Lamb.
Secretary.

Tea Research Institute,
Talawakelle.

MINUTES OF THE MEETING OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON HELD AT THE OFFICES OF THE PLANTERS' ASSOCIATION OF CEYLON AT 2-30 P.M. ON FRIDAY, 19TH FEBRUARY, 1954.

Present :—Mr. R. C. Scott, C.B.E. (Chairman), Dr. A. W. R. Joachim, O.B.E. (Director of Agriculture), Messrs W. R. Vander Kiste (Chairman, Planter's Association of Ceylon), C. D. Green (Chairman, Agency Section, Planters' Association of Ceylon), T. E. D. Loftus, C.C.S. (Asst. Secretary, Ministry of Finance, representing the Minister of Finance), B. Mahadeva, C.C.S. (Tea Controller), V. G. W. Ratnayake, M.B.E., M.P., A. J. Dickson, H. S. Hurst, G. K. Newton, A. D. McLeod, W. H. Attfield, W. Neal de Alwis, M.P., D. E. Hettiarachchi, J.P., U.M., Errol Jayawickrema, J.P., U.M., and J. Lamb (Director and Secretary).

1. Notice convening the meeting was read.

2. **Minutes of the Meeting of the Board held on 11th December, 1953.**

Copies of the minutes had been issued to members. The minutes were confirmed without comment.

3. **Membership of the Board & Committees.**

(a) Board.

The Chairman reported that the Tea Controller, Mr. B. Mahadeva, became an *ex-officio* member of the Board as from 19th December, 1953, the date the Tea Research (Amendment) Bill No. 31 became effective.

(b) Estate & Experimental Sub-Committee.

Mr. S. P, Vythilingam M.P. had returned from leave and resumed his seat on the Committee.

Mr. R. Leaning had resumed his seat on his return from leave relieving Mr. A. Hudson who had been acting for him. It was, however, expected that Mr. Leaning would resign his seat in the very near future.

4. **Finance**

(a) Investments :-

The Chairman reported that the following sums were available for investment on behalf of :—

Tea Research Institute	Rs.	75,000.00
Junoir Staff Provident Fund	,,	30,000.00
Junior Staff Medical Fund	,,	3,000.00
Small Holdings Advisory Service	,,	70,000.00

To the above should be added the proceeds of the 2½% National War Bonds holding of £.6,750 (Approximately Rs. 90,000) held by the Tea Research Institute which matures on 1st March, 1954, and the Rs. 50,000 General Treasury Bonds holdings held on behalf of the Small Holdings Advisory Service and which matured on 15th February, 1954.

(b) Audited Accounts for 1952 and Report thereon.

(i) *Tea Research Institute.*

The Chairman stated the copies of the audited accounts and report had been issued to all members. Members would recall that these were tabled at the last Board meeting and accepted in principle. The accounts and the report there on were accepted without comment.

(ii) *T. R. I. Junior Staff Provident Fund.*

The Chairman commented on the very satisfactory state of affairs as evidenced from the Balance Sheet.

(iii) *T. R. I. Junior Staff Medical Fund.*

The Chairman reported that contributions to the Fund for the year had totalled Rs. 12,201/35 and that amount paid out as medical aid to members amounted to Rs. 3,725/08.

(c) Tea Research (Amendment) Bill No. 31 (1953).

The Chairman reported that the Bill amending the rate of the Tea Research Institute Cess from -/35 cts. to -/55 cts. per 100 lbs. of tea exported had received the Governor General's assent on the 19th of December, 1953. The cess collected for the first month (i.e. January, 1954) at the new rate had amounted to Rs. 184,124/09.

(d) Extension to Senior Staff Bungalows.

The Chairman said that the Engineer had gone into the details of the estimates very carefully in consultation with Mr. Vander Kiste and recommended the acceptance of the estimate of Messrs M. Y. Hemachandra & Co. Approved.

5. **Staff**

Technical Assistant to the Director.

The Chairman reported that the Appointments Sub-Committee had met at Peradeniya in the Vice-Chancellor's Office on February 1st to make the selection. Four candidates short-listed from a total of fourteen applications were interviewed. It was unanimously decided to recommend the appointment of Mr. J. V. Harbord. With Mr. Harbord's appointment, the Director's work would be considerably lightened.

It was agreed on the proposal of Mr. H. S. Hurst seconded by Mr. W. H. Attfield that Mr. Harbord be appointed. Mr. N. Sivagnanalingam was the best of the others.

The Director, in reply to Mr. Vander Kiste who enquired when Mr. Harbord would take up the appointment, stated that he hoped it would be in about 3 months. The Chairman said that it was not yet decided as to what salary should be paid to Mr. Harbord. This would come up at the next meeting of the Board.

6. **Any other Business**

(a) St. Coombs Estate Valuation.

The Chairman reported that Mr. Newton had submitted a valuation of St. Coombs estate. His figure is Rs. 822,000/- at Rs. 3,000/- per acre based on a return of 15—17% or 6 years purchase on a profit of Rs. 500 per acre. He considered this to be a very favourable valuation and thanked Mr. Newton on behalf of the Board.

(b) Expert to assist with the Mechanisation of the Tea Industry.

Information had been received from the Treasury that since the Technical Co-operation Scheme of the Colombo Plan was due to end on the 30th June, 1957, the country providing the expert would not be prepared to pay an officer for a period beyond that date.

The suggested duration of the appointment of the expert was 5 years. If it should be necessary to continue the engagement of the expert beyond the prescribed date, the Tea Research Institute would have to meet the costs.

(c) St. Coombs Estate Crop for 1953.

The Chairman informed the meeting that St. Coombs had yielded a record crop of 277,183 lbs. for 1953. The yield per acre was 1,014 lbs. He further remarked that St. Coombs teas had improved in quality and were now fetching very good prices.

(d) St. Coombs Factory.

The Chairman reported that the Engineer had recommended the following improvements to the St. Coombs factory :—

(1) Painting of ceilings of rolling room, firing room and office ... ... Rs. 3,300.00

(2) Painting of ceilings of sifting room, new office and furnace verandah ... ... Rs. 1,250.00

He had also suggested the erection of a Leaf Hoist at the factory entrance to replace the present factory steps. This was estimated to cost Rs. 6,500/-.

Mr. A. J. Dickson suggested that the hoist should be one operated on the endless chain principle.

A vote of Rs. 11,050/- for painting the ceilings and the installation of the leaf hoist was approved.

(e) Retirement of Mr. W. H. Attfield.

The Chairman referred to the impending departure of Mr. W. H. Attfield on retirement. On behalf of the board he thanked Mr. Attfield for the long and useful service he had rendered to the Institute as a member of the Board and Finance Sub-Committee and wished him happiness and prosperity in his retirement.

The meeting terminated with a vote of thanks to the Chair.

(Sgd.) J. LAMB.
Secretary.

Tea Research Institute of Ceylon
St. Coombs,
Talawakelle.

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